



HY13-1518-M1/USA

# TK Series Service Procedure

Effective: July, 2001

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## Low Speed High Torque, Hydraulic Motors

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 **WARNING**

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## Definitions

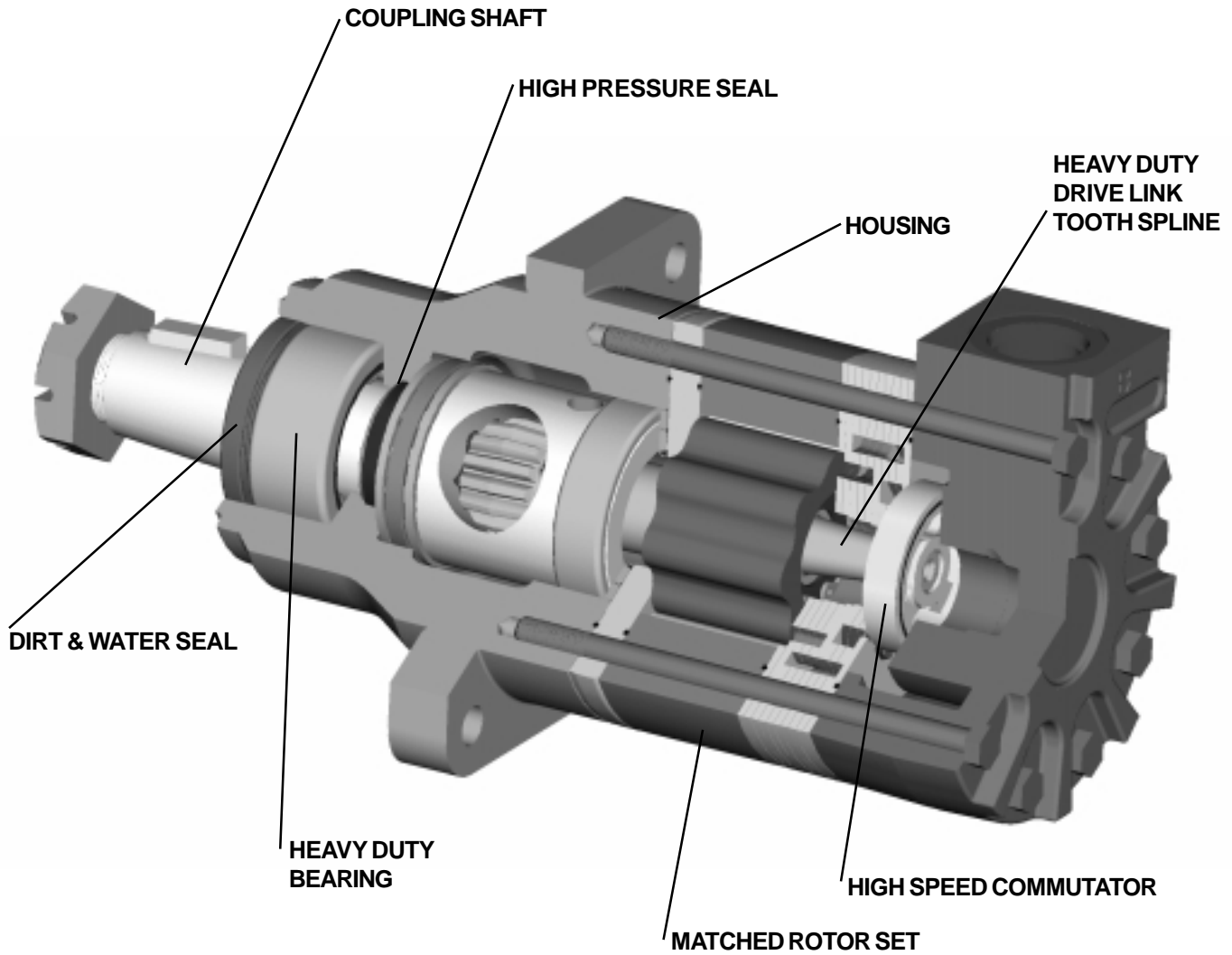
- NOTE:** A NOTE provides key information to make a procedure easier or quicker to complete.
- CAUTION:** A CAUTION refers to procedure that must be followed to avoid damaging the Torqmotor or other system components.
- WARNING:** A WARNING REFERS TO PROCEDURE THAT MUST BE FOLLOWED FOR THE SAFETY OF THE EQUIPMENT OPERATOR AND THE PERSON INSPECTING OR REPAIRING THE TORQMOTOR.

## Disclaimer

This Service Manual has been prepared by Parker Hannifin for reference and use by mechanics who have been trained to repair and service hydraulic motors and systems on commercial and non-commercial equipment applications. Parker Hannifin has exercised reasonable care and diligence to present accurate, clear and complete information and instructions regarding the techniques and tools required for maintaining, repairing and servicing the complete line of Parker TK Torqmotor Units. However, despite the care and effort taken in preparing this general Service Manual, Parker **makes no warranties** that (a) the Service Manual or any explanations, illustrations, information, techniques or tools described herein are either accurate, complete or correct as applied to a specific Torqmotor unit, or (b) any repairs or service of a particular Torqmotor unit will result in a properly functioning Torqmotor unit.

If inspection or testing reveals evidence of abnormal wear or damage to the Torqmotor unit or if you encounter circumstances not covered in the Manual, STOP – CONSULT THE EQUIPMENT MANUFACTURER’S SERVICE MANUAL AND WARRANTY. DO NOT TRY TO REPAIR OR SERVICE A TORQMOTOR UNIT WHICH HAS BEEN DAMAGED OR INCLUDES ANY PART THAT SHOWS EXCESSIVE WEAR UNLESS THE DAMAGED AND WORN PARTS ARE REPLACED WITH ORIGINAL PARKER REPLACEMENT AND SERVICE PARTS AND THE UNIT IS RESTORED TO PARKER SPECIFICATIONS FOR THE TORQMOTOR UNIT.

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular Torqmotor unit to (a) inspect the unit for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the equipment, or the safe operation of the Torqmotor, and (c) fully inspect and test the Torqmotor unit and the hydraulic system to insure that the repair or service of the Torqmotor unit has been properly performed and that the Torqmotor and hydraulic system will function properly.

**TK Series features include:**

- The roller vane rotor set design offers low-friction and wear compensation which maximizes the useful performance life of the motor.
- Zero leak commutation valve provides greater, more consistent volumetric efficiency.
- Heavy duty spline geometry.
- Flow thru lubrication provides cooling extending motor life.
- Full interchangeability with other motors which are designed according to industry standards.
- Compatible with most hydraulic systems with regard to pressure, torque and speed.
- A unique high-pressure shaft seal that eliminates the need for case drains.
- Up to 73 horsepower output.
- Heavy duty roller bearings for high side loads.

This service manual has one purpose: to guide you in maintaining, troubleshooting, and servicing the TK Torqmotor (low-speed, high-torque hydraulic motor).

Material in this manual is organized so you can work on the Torqmotor and get results without wasting time or being confused. To get these results, you should read this entire manual before you begin any work on the Torqmotor.

This manual also contains troubleshooting information and checklist. If you must service the Torqmotor, the checklist will help you to determine where the problem may be.

The three-column format of the Disassembly and Inspection, and Assembly sections will make it easier for you to conduct major work on the Torqmotor. Column 1 gives a brief key for each procedure. Column 2 explains in detail the procedure you should follow.

Column 3 illustrates this procedure with photographs. Read all material carefully and pay special attention to the notes, cautions, and warnings.

A page with the Torqmotor exploded assembly view is

provided several places in this manual. The component part names and item numbers assigned on this exploded assembly view correspond with names and item numbers (in parentheses) used in the disassembly and assembly procedures set forth in this manual.

Service part list charts are also provided in this manual with the part names and exploded view item numbers cross referenced to Parker service part numbers.

Service parts are available through the Original Equipment Manufacturer or Parker approved TK Distributors.

As you gain experience in servicing the Torqmotor, you may find that some information in this manual could be clearer or more complete. If so, let us know about it. Do not try to second guess the manual. If you are stuck, contact us. Servicing the Torqmotor should be a safe and productive procedure, in order for the unit to deliver the reliable, long-life operation engineered into it.

NOTE: Before troubleshooting any system problem, check service literature published by the equipment and/or component manufacturers. Follow their instructions, if given, for checking any component other than the Torqmotor unit.

## Preparation

Make your troubleshooting easier by preparing as follows:

- work in a clean, well-lighted place;
- have proper tools and materials nearby;
- have an adequate supply of clean petroleum-based solvent.

**WARNING: SINCE SOLVENTS ARE FLAMMABLE, BE EXTREMELY CAREFUL WHEN USING ANY SOLVENT, EVEN A SMALL EXPLOSION OR FIRE COULD CAUSE INJURY OR DEATH.**

**WARNING: WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA AND OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.**

## Preliminary Checks

Hydraulic systems are often trouble-free. Hence, the problem an operator complains of could be caused by something other than the hydraulic components.

Thus, once you have determined that a problem exists, start with the easy-to-check items, such as:

- parts damaged from impact that were not properly repaired, or that should have been replaced; and
- improper replacement parts used in previous servicing
- mechanical linkage problems such as binding, broken, or loose parts or slipping belts

## Hydraulic Components

If you think the problem is caused by a hydraulic component, start by checking the easy-to-reach items.

Check all hoses and lines for cracks, hardening, or other signs of wear. Reroute any usable hoses that are kinked, severely bent, or that rest against hot engine parts. Look for leaks, especially at couplings and fittings. Replace any hoses or lines that don't meet system flow and pressure ratings.

Next, go to the reservoir and filter or filters. Check fluid level and look for air bubbles. Check the filter(s). A filter with a maximum 50 micron filtration is recommended for the Torqmotor system.

Visually check other components to see if they are loosely mounted, show signs of leaks, or other damage or wear.

Excessive heat in a hydraulic system can create problems that can easily be overlooked. Every system has its limitation for the maximum amount of temperature. After the temperature is attained and passed, the following can occur:

- oil seal leaks
- loss of efficiency such as speed and torque
- pump loss of efficiency
- pump failure
- hoses become hard and brittle
- hose failure

A normal temperature range means an efficient hydraulic system. Consult the manuals published by equipment and/or component manufacturers for maximum allowable temperature and hydraulic tests that may be necessary to run on the performance of the hydraulic components. The Torqmotor is not recommended for hydraulic systems with maximum temperatures above 200°F (93.3°C).

| Trouble  | Cause   | Remedy  |
|--|---|---|
| <b>Oil Leakage</b>   | 1. Hose fittings loose, worn or damaged.  | Check & replace damaged fittings or "O" Rings. Torque to manufacturers specifications.          |
|  | 2. Oil seal rings (5) deteriorated by excess heat.  | Replace oil seal rings by disassembling Torqmotor unit.   |
|  | 3. Special bolt (1) loose or its sealing area deteriorated by corrosion.                      | (a) Loosen then tighten single bolt to torque specification.<br><br>(b) Replace bolt.           |
|  | 4. Internal shaft seal (18) worn or damaged.  | Replace seal. Disassembly of Torqmotor unit necessary.  |
|  | 5. Worn coupling shaft (14) and internal seal (18).   | Replace coupling shaft and seal by disassembling Torqmotor unit.                                |
| <b>Significant loss of speed under load</b>  | 1. Lack of sufficient oil supply  | (a) Check for faulty relief valve and adjust or replace as required.                            |
|  |   | (b) Check for and repair worn pump.   |
|  |   | (c) Check for and use correct oil for temperature of operation.                                 |
|  | 2. High internal motor leakage  | Replace worn rotor set by disassembling Torqmotor unit.   |
| 3. Severely worn or damaged internal splines.  | Replace rotor set, drive link and coupling shaft by disassembling Torqmotor unit.             |   |
| 4. Excessive heat.   | Locate excessive heat source (usually a restriction) in the system and correct the condition. |   |
| <b>Low mechanical efficiency or undue high pressure required to operate Torqmotor unit</b> | 1. Line blockage  | Locate blockage source and repair or replace.   |
|  | 2. Internal interference  | Disassemble Torqmotor unit, identify and remedy cause and repair, replacing parts as necessary. |
|  | 3. Lack of pumping pressure   | Check for and repair worn pump.   |
|  | 4. Excessive binding or loading in system external to Torqmotor unit.                         | Locate source and eliminate cause.  |

**CAUTION: If the hydraulic system fluid becomes overheated [in excess of 200°F (93.3°C)], seals in the system can shrink, harden or crack, thus losing their sealing ability.**

**Tools and Materials Required for Servicing TK Series**

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- Clean, petroleum-based solvent
- Emery paper
- Vise with soft jaws
- Air pressure source
- Arbor press
- Screw driver
- Masking tape
- Breaker bar
- Torque wrench-ft. lbs. (N m)
- Sockets: 1/2 or 9/16 inch thin wall, 1 inch
- Allen Sockets: 3/16, 3/8 inch
- Adjustable crescent wrench or hose fitting wrenches
- SAE 10W40 SE or SF oil
- Special bearing mandrel for TK Torqmotor (SEE FIGURE 1)
- Feeler gage .005 inch (.13 mm)
- TK Torqmotor requires blind hole bearing puller for a 1.750 inch dia. (44.45 mm) and 2.750 inch dia. (69.85 mm) bearings.
- Clean corrosion resistant grease. Part #406018 is included in each seal kit. Recommended grease is Parker Specification #045236 or Mobil Mobilith SHC® 460

**NOTE: The available service seal kits include the recommended grease as a grease pack #406018**

**CAUTION: Mixing greases that have different bases can be detrimental to bearing life.**

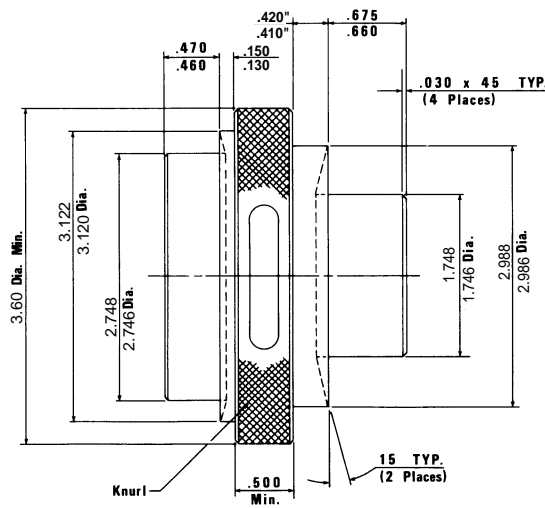


### CONVERSIONS

| INCHES | mm    | INCHES | mm    |
|--------|-------|--------|-------|
| .020   | .51   | 1.060  | 26.92 |
| .021   | .53   | 1.295  | 32.89 |
| .029   | .74   | 1.297  | 32.94 |
| .030   | .76   | 1.396  | 35.46 |
| .111   | 2.81  | 1.398  | 35.51 |
| .119   | 3.02  | 1.620  | 41.15 |
| .152   | 3.86  | 1.622  | 41.20 |
| .160   | 4.06  | 1.983  | 50.37 |
| .296   | 7.52  | 1.985  | 50.42 |
| .304   | 7.72  | 2.120  | 53.85 |
| .460   | 11.68 | 2.122  | 53.90 |
| .470   | 11.94 | 2.233  | 56.72 |
| .500   | 12.70 | 2.235  | 56.77 |
| .585   | 14.86 | 2.483  | 63.07 |
| .595   | 15.11 | 2.485  | 63.12 |
| .660   | 16.76 | 2.500  | 63.5  |
| .675   | 17.15 | 2.88   | 73.2  |
| 1.058  | 26.87 |        |       |

### Torque Chart

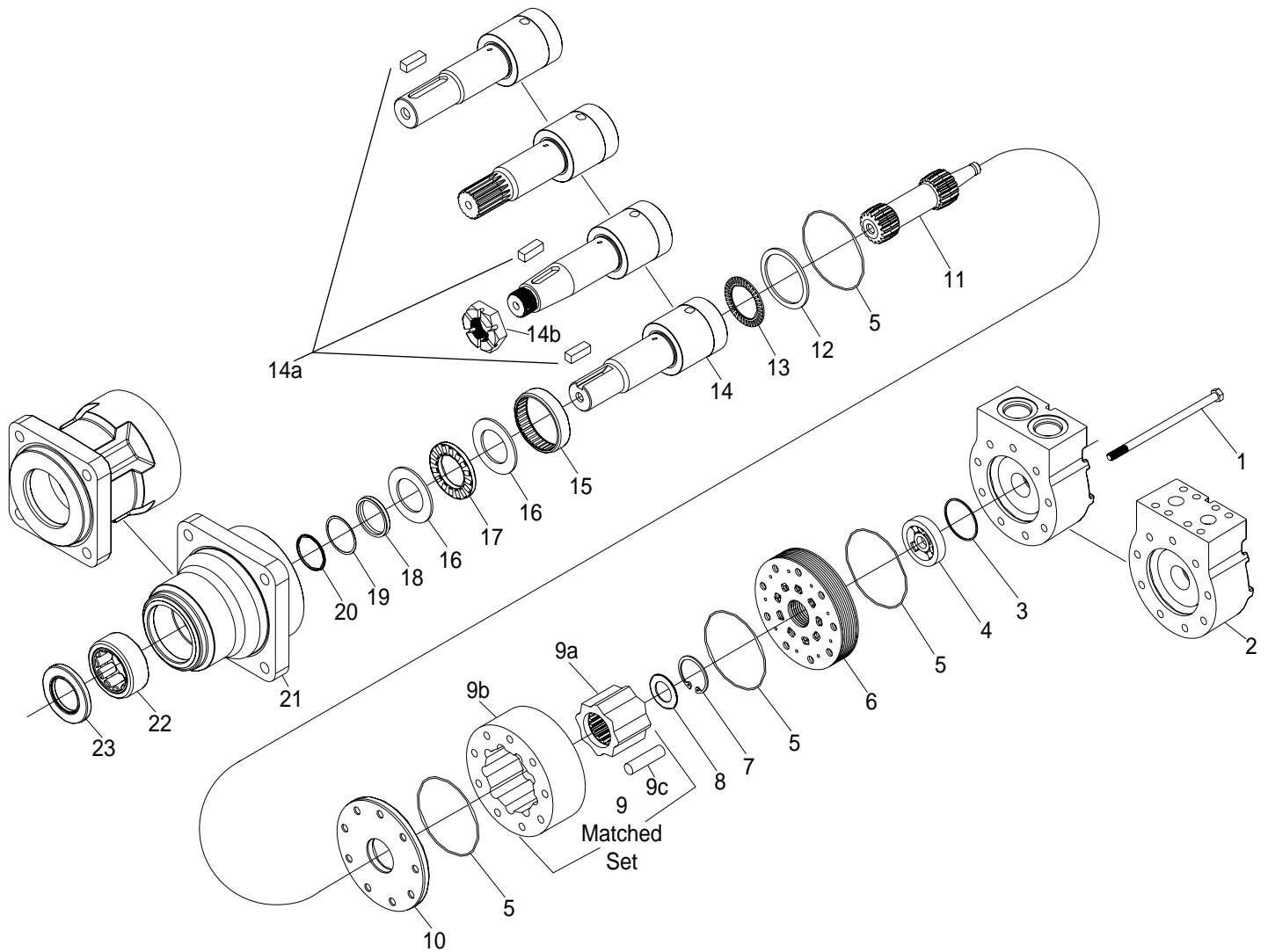
| Part Name            | Item Number | Torque                         |
|----------------------|-------------|--------------------------------|
| bolt 3/8 24 UNF 2A   | 1           | 45-55 ft. lbs. (60-76 N m)     |
| nut 1-1/4 18 UNEF 2B | 14b         | 350-450 ft. lbs. (475-610 N m) |



(Fabricate if considered necessary)

Figure 1

**Typical Assembly**



| Item No. | Description            |
|----------|------------------------|
| 1        | Special Bolt           |
| 2        | Endcover               |
| 3        | Seal Ring - Commutator |
| 4        | Commutator             |
| 5        | Seal Ring              |
| 6        | Manifold               |
| 7        | Retaining Ring         |
| 8        | Rotor Washer           |
| 9        | Rotor Set              |
| 9a       | Rotor                  |
| 9b       | Stator                 |
| 9c       | Vane (9)               |
| 10       | Wear Plate             |
| 11       | Drive Link             |
| 12       | Retaining Washer       |
| 13       | Thrust Bearing         |
| 14       | Coupling Shaft         |
| 14a      | Key                    |
| 14b      | Nut                    |
| 15       | Radial Bearing         |
| 16       | Thrust Washer          |
| 17       | Thrust Bearing         |
| 18       | Shaft Seal             |
| 19       | Back Up Washer         |
| 20       | Back Up Ring           |
| 21       | Housing                |
| 22       | Radial Bearing         |
| 23       | Dirt & Water Seal      |

Note: See "Service Parts List Chart" page 11 for all part numbers.

**Chart Use Example:**

TK0200K5320AAAB Torqmotor includes part numbers listed to the right of TK (SERIES), 0200 (DISP.), K (MOUNTING), 5 (PORTING), 32 (SHAFT), 0 (ROTATION), and AAAB (OPTION) shown in the left hand column of the chart.

**Caution:**

The charted component service information is for the Torqmotors listed only. Refer to the original equipment manufacturer of the equipment using the Torqmotor for assembly numbers not listed below.

| EXPLODED VIEW     |             |            |                     |            |                |               |                  |                |               |             |                            |      |
|-------------------|-------------|------------|---------------------|------------|----------------|---------------|------------------|----------------|---------------|-------------|----------------------------|------|
| SERIES            | ITEM #      | 4          | 6                   | 10         | 13             | 15            | 16               | 17             | 19            | 20          | 22                         | 23   |
|                   | DESCRIPTION | COMMUTATOR | MANIFOLD (SEE NOTE) | WEAR PLATE | THRUST BEARING | INNER BEARING | THRUST WASHER(2) | THRUST BEARING | BACKUP WASHER | BACKUP RING | OUTER DIRT & WATER BEARING | SEAL |
| TK-Service Part # | TK014000    | TK015000   | 477983              | 070029     | 073007         | 069033 (2)    | 070028           | 028549         | 032851        | 070027      | 478082                     |      |

| EXPLODED VIEW      |                                     |          |                  |            |                 |
|--------------------|-------------------------------------|----------|------------------|------------|-----------------|
| DISPLACEMENT GROUP | ITEM #                              | 1        | 8                | 11         |                 |
|                    | DISPLACEMENT (in <sup>3</sup> /rev) | BOLT (7) | STATOR THICKNESS | ROTOR SET  | DRIVE LINK LINK |
| 0200-12.2          | 021472                              | .6882    | TK02007003       | TK02003000 | 5.520           |
| 0250-15.3          | 021378                              | .8601    | TK02507003       | TK02503000 | 5.692           |
| 0315-19.2          | 021366                              | 1.0836   | TK03157003       | TK03153000 | 5.916           |
| 0400-24.4          | 021394                              | 1.3761   | TK04007003       | TK04003000 | 6.209           |
| 0500-30.5          | 021473                              | 1.7199   | TK05007003       | TK05003000 | 6.553           |
| 0630-38.4          | 021474                              | 2.1668   | TK06307003       | TK06303000 | 7.000           |
| 0800-48.8          | 021388                              | 2.7522   | TK08007003       | TK08003000 | 7.585           |
| 1000-61.0          | 021475                              | 3.4398   | TK10007003       | TK10003000 | 8.273           |

| FRONT HOUSING<br>Mounting Code | EXPLODED VIEW      |                 |                  |
|--------------------------------|--------------------|-----------------|------------------|
|                                | ITEM #             | 21              |                  |
|                                | DESCRIPTION        | SERVICE HOUSING | HOUSING ASSEMBLY |
| K -                            | SAE CC (4 Bolt)    | TK012002        | TK012002A1       |
| T -                            | Wheel Mt. (4 Bolt) | TK012001        | TK012001A1       |

| REAR HOUSING*<br>Porting Code | EXPLODED VIEW                      |           |
|-------------------------------|------------------------------------|-----------|
|                               | ITEM #                             | 2         |
|                               | DESCRIPTION                        | END COVER |
| 5 -                           | Rear Port (1 5/16" O-Ring; Radial) | TK016000  |
| 4 -                           | Rear Port (Manifold; Radial)       | TK016001  |

\*TK Series Motors only available in rear ported option.

| COUPLING SHAFT GROUP<br>Shaft Code | EXPLODED VIEW |          |        |        |
|------------------------------------|---------------|----------|--------|--------|
|                                    | ITEM #        | 14       | 14a    | 14b    |
|                                    | DESCRIPTION   | SHAFT    | KEY    | NUT    |
| 32-1-1/2"                          | Straight Key  | TK019002 | 039040 |        |
| 36-17                              | Tooth Spline  | TK019003 |        |        |
| 63-1-3/4"                          | Tapered Shaft | TK019001 | 039049 | 025133 |
| 64-40mm                            | Straight Key  | TK019004 | 039050 |        |

| OPTION GROUP | EXPLODED VIEW |                 |            |            |
|--------------|---------------|-----------------|------------|------------|
|              | ITEM #        | 3               | 4          | 16         |
|              | DESCRIPTION   | COMMUTATOR SEAL | INNER SEAL | INNER SEAL |
| AAAA         | Black Paint   | 032852          | 032807     | 032850     |

For reverse timed manifold, use TK015001.

Standard seal kit SK000167 includes five #032807 seal rings, #032852 commutator seal, #032850 inner seal, #028549, #032851 backup washer, backup ring, #478082 dirt & water seal, #406018 grease pack and bulletin #050034.

## Preparation Before Disassembly

- Before you disassemble the Torqmotor unit or any of its components read this entire manual. It provides important information on parts and procedures you will need to know to service the Torqmotor.
- Refer to “Tools and Materials Required for Services” section for tools and other items required to service the Torqmotor and have them available.
- Thoroughly clean off all outside dirt, especially from around fittings and hose connections, before disconnecting and removing the Torqmotor. Remove rust or corrosion from coupling shaft.
- Remove coupling shaft connections and hose fittings and immediately plug port holes and fluid lines.
- Remove the Torqmotor from system, drain it of fluid and take it to a clean work surface.
- Clean and dry the Torqmotor before you start to disassemble the unit.
- As you disassemble the Torqmotor clean all parts, except seals, in clean petroleum-based solvent, and blow them dry.

**WARNING:** petroleum-base solvents are flammable. Be extremely careful when using any solvent. Even a small explosion or fire could cause injury or death.

**WARNING:** WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA OR OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.

**CAUTION:** Never steam or high pressure wash hydraulic components. Do not force or abuse closely fitted parts.

- Keep parts separate to avoid nicks and burrs.
- Discard all seals and seal rings as they are removed from the Torqmotor. Replace all seals, seal rings and any damaged or worn parts with genuine Parker or OEM approved service parts.

**CAUTION:** Special lifting aids may be required to handle/service the TK motor due to its large size and weight. Take steps necessary to ensure that handling/service can be done safely.

## Reference Exploded Assembly View

- Place Torqmotor in a vise**
1. Place the Torqmotor in a soft jawed vice or similar support, with coupling shaft (14) pointed down and the vise jaws clamping firmly on the sides of the housing (21) mounting flange.

**WARNING** IF THE TORQMOTOR IS NOT FIRMLY HELD IN THE VISE, IT COULD BE DISLODGED DURING THE SERVICE PROCEDURES, CAUSING INJURY.

- Scribe alignment mark**
2. Scribe an alignment mark down and across the Torqmotor components from end cover (2) to housing (21) to facilitate reassembly orientation where required. SEE FIGURE 2.

- Remove special bolts & inspect bolts**
3. Remove the nine special hex head bolts (1) using a 9/16 inch size socket. SEE FIGURE 3. Inspect bolts for damaged threads. Replace damaged bolts. SEE FIGURE 4.



Figure 2



Figure 3



Figure 4

**Remove end cover & inspect bolts**

4. Remove end cover (2) and seal ring (5). Discard seal ring. SEE FIGURE 5.

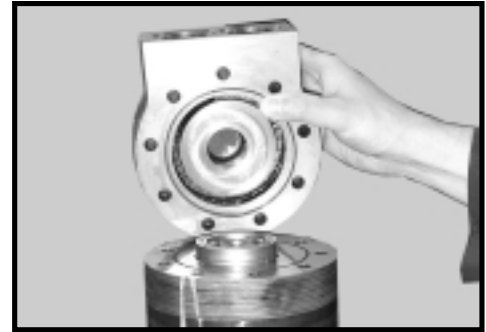


Figure 5

**Wash & inspect end cover**

6. Thoroughly wash end cover (2) in proper solvent and blow dry. Be sure the end cover flow areas, are free of contamination. Inspect end cover for cracks and the bolt head recesses for damage. Replace end cover as necessary. SEE FIGURE 6.

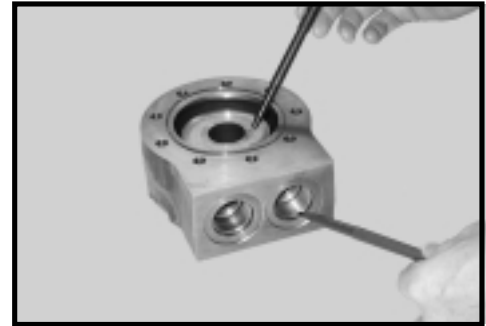


Figure 6

**NOTE**

**A polished pattern (not scratches) on the cover from rotation of the commutator (4) is normal. Discoloration would indicate excess fluid temperature, thermal shock, or excess speed and require system investigation for cause and close inspection of end cover, commutator, manifold, and rotor set.**

**Remove & inspect commutator**

8. Remove commutator (4) and seal ring (3) Remove seal ring from commutator, using an air hose to blow air into ring groove until seal ring is lifted out and discard seal ring. Inspect commutator for cracks or burrs, wear, scoring, spalling or brinelling. If any of these conditions exist, replace commutator. SEE FIGURE 7 & 8.



Figure 7



Figure 8

**Remove manifold**

9. Remove manifold (6) and inspect for cracks surface scoring, brinelling or spalling. Replace manifold if any of these conditions exist. SEE FIGURE 9. A polished pattern on the ground surface from commutator or rotor rotation is normal. Remove and discard the seal ring (5).

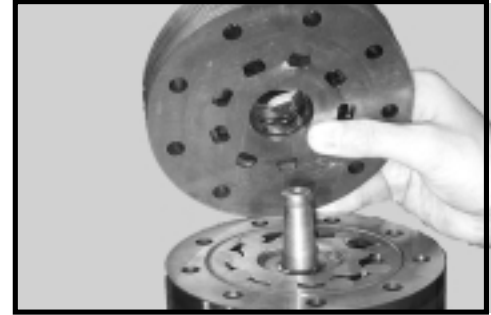


Figure 9

**NOTE**

**The manifold is constructed of plates bonded together to form an integral component not subject to further disassembly for service. Compare configuration of both sides of the manifold to ensure that same surface is reassembled against the rotor set.**

**Remove & inspect rotor set & wearplate**

10. Remove rotor set (9) and wearplate (10), together to retain the rotor set in its assembled form, maintaining the same rotor vane (9c) to stator (9b) contact surfaces. SEE FIGURE 10. The drive link (11) may come away from the coupling shaft (14) with the rotor set, and wearplate. You may have to shift the rotor set on the wearplate to work the drive link out of the rotor (9a) and wearplate. Inspect the rotor set in its assembled form for nicks, scoring, or spalling on any surface and for broken or worn splines. If the rotor set component requires replacement, the complete rotor set must be replaced as it is a matched set. Inspect the wearplate for cracks, brinelling, or scoring. Discard seal rings (5) between the rotor set, and the wearplate.

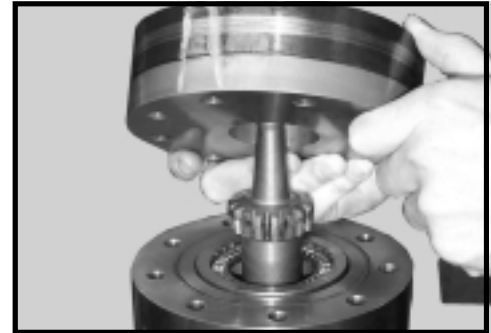


Figure 10

**NOTE**

**The rotor set (9) components may become disassembled during service procedures. Marking the surface of the rotor and stator that is facing UP, with etching ink or grease pencil before removal from Torqmotor will ensure correct reassembly of rotor into stator and rotor set into Torqmotor. Marking all rotor components and mating spline components for exact repositioning at assembly will ensure maximum wear life and performance of rotor set and Torqmotor.**

**NOTE** Series TK Torqmotor may have a rotor set with two stator halves (9B) with a seal ring (5) between them. Discard seal ring only if stator halves become disassembled during the service procedures.

**NOTE** A polished pattern on the wear plate from rotor rotation is normal.

**Check rotor, vane clearance**

11. Place rotor set (9) and wear plate (10) on a flat surface and center rotor (9a) in stator (9b) such that two rotor lobes (180 degrees apart) and a roller vane (9c) centerline are on the same stator centerline. Check the rotor lobe to roller vane clearance with a feeler gage at this common centerline. If there is more than .005 inches (0.13 mm) of clearance, replace rotor set. SEE FIGURE 11.

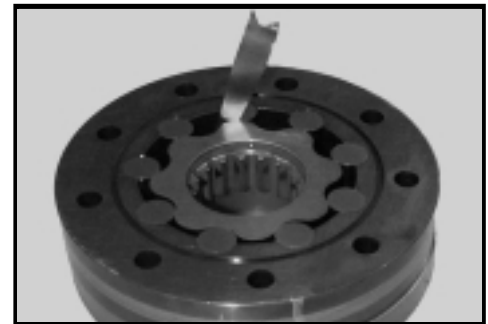


Figure 11

**NOTE** If rotor set (9) has two stator halves (9b), check the rotor lobe to roller vane clearance at both ends of rotor.

**Remove & inspect drive link**

12. Remove drive link (11) from coupling shaft (14) if it was not removed with rotor set and wear plate. Inspect drive link for cracks and worn or damaged splines. No perceptible lash (play) should be noted between mating spline parts. SEE FIGURE 12. Remove and discard seal ring (5) from housing (21).



Figure 12

**Remove thrust bearing**

13. Remove rear thrust bearing (13) and retaining washer (12) from top of coupling shaft (14). Inspect for wear, brinelling, corrosion and a full complement of retained rollers. SEE FIGURE 13.



Figure 13



**Check coupling shaft for rust or corrosion**      14. Check exposed portion of coupling shaft (14) to be sure you have removed all signs of rust and corrosion which might prevent its withdrawal through the seal and bearing. Crocus cloth or fine emery paper may be used. Remove any key (14A), nut (14B), washer, bolt, or lock washer still attached to the shaft.

**Remove & inspect coupling shaft**      15. Remove coupling shaft (14), by pushing on the output end of shaft. SEE FIGURE 14. Inspect coupling shaft bearing and seal surfaces for spalling, nicks, grooves, severe wear or corrosion and discoloration. Inspect for damaged or worn internal and external splines or keyway. SEE FIGURE 15. Replace coupling shaft if any of these conditions exist.

**NOTE**      **Minor shaft wear in seal area is permissible. If wear exceeds .020 inches (0.51 mm) diametrically, replace coupling shaft.**

**NOTE**      **A slight “polish” is permissible in the shaft bearing areas. Anything more would require coupling shaft replacement.**

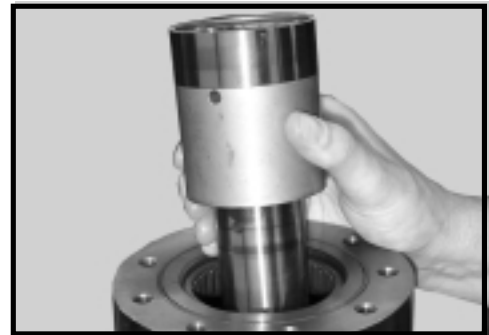


Figure 14



Figure 15

18. Remove seal (18), backup washer (19), and backup ring (20) from TK Series Torqmotor housing by working them around unseated thrust washers (16) and thrust bearing (17) and out of the housing. Discard seal and washers. SEE FIGURE 16.



Figure 16

**Remove dirt & water seal**

19. Remove housing (21) from vise, invert it and remove and discard seal (23). A blind hole bearing or seal puller is required. SEE FIGURE 17.

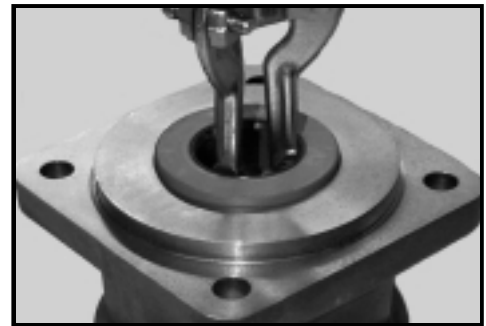


Figure 17

**Inspect housing assembly**

20. Inspect housing (21) assembly for cracks, the machined surfaces for nicks, burrs, brinelling or corrosion. Remove burrs that can be removed without changing dimensional characteristics. Inspect tapped holes for thread damage. SEE FIGURE 18. If the housing is defective in these areas, discard the housing assembly.

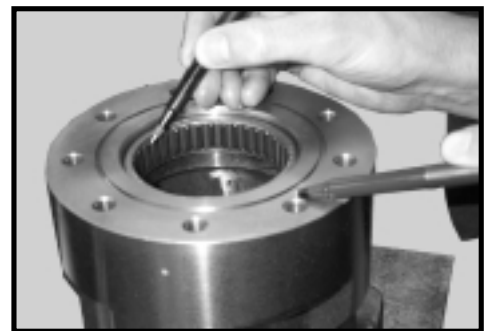


Figure 18

- Inspect housing bearings** 21. If the housing (21) assembly has passed inspection to this point, inspect the housing bearings (22) and (15) and since they are captured in the housing cavity, the two thrust washers (16) and thrust bearing (17). The bearing rollers must be firmly retained in the bearing cages, but must rotate and orbit freely. All rollers and thrust washers must be free of brinelling and corrosion.

**NOTE** The depth or location of bearing (15) in relation to the housing wear plate surface should be measured and noted before removing the bearings. This will facilitate the correct reassembly of new bearings. SEE FIGURE 19.



Figure 19

- Remove bearings & thrust washers** 22. If the bearings, or thrust washers must be replaced use a suitable size bearing puller to remove bearing (15) from housing (21) without damaging the housing. Remove thrust washers (16) and thrust bearing (17) and replace. SEE FIGURES 20 & 21.



Figure 20



Figure 21

THE DISASSEMBLY OF TORQMOTOR IS NOW COMPLETE.

- Replace all seals and seal rings with new ones each time you reassemble the Torqmotor unit. Lubricate all seals and seal rings with SAE 10W40 oil or clean grease before assembly.
- **NOTE: Complete seal kits are available. SEE FIGURE 22. The parts should be available through most OEM parts distributors or Parker approved Torqmotor distributors. (Contact your local dealer for availability).**
- **NOTE: Unless otherwise indicated, do not oil or grease parts before assembly.**
- Wash all parts in clean petroleum-based solvents before assembly. Blow them dry with compressed air. Remove any paint chips from mating surfaces of the end cover, commutator set, manifold rotor set, wear plate and housing and from port and sealing areas.

**WARNING**

**SINCE THEY ARE FLAMMABLE, BE EXTREMELY CAREFUL WHEN USING ANY SOLVENT. EVEN A SMALL EXPLOSION OR FIRE COULD CAUSE INJURY OR DEATH.**

**WARNING**

**WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA OR OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.**

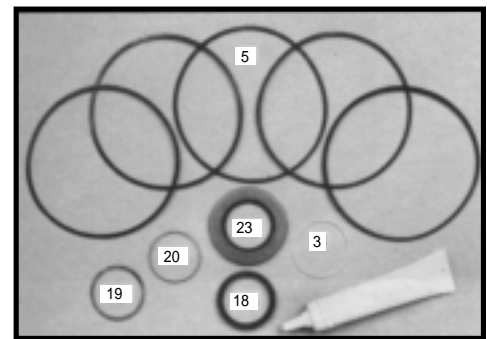


Figure 22 Seal Kit

**Press in outer bearing**

1. If the housing (21) bearing components were removed for replacement, thoroughly coat and pack a **new** outer bearing (22) with clean corrosion resistant grease recommended in the material section. Press the new bearing into the counterbore at the mounting flange end of the housing, using the appropriate sized bearing mandrel such as described in figure 1 which will control the bearing depth to .410/ .420" from the outside face of the counter bore.



Figure 23

**NOTE** Bearing mandrel must be pressed against the lettered end of bearing shell. Take care that the housing bore is square with the press base and the bearing is not cocked when pressing a bearing into the housing.



Figure 24

**CAUTION** If the bearing mandrel specified in the “Tools and Materials Required for Servicing” section is not available and alternate methods are used to press in bearing (15) or (22) be careful to ensure that the bearing depths specified are achieved to insure adequate bearing support and correct relationship to adjacent components when assembled. SEE FIGURE 24.

**CAUTION** Because bearings (15) and (22) have a press fit into the housing they must be discarded when removed. They must not be reused.



Figure 25

**Press in inner bearing**

2. The Large Frame TK Series Torqmotor housing (21) requires that you assemble a **new** backup washer (19), **new** seal (18), with the lip facing to the inside of Torqmotor (see figure 45), **new** thrust washer (16), **new** thrust bearing (17) and a **new** second thrust washer (16) in that order before pressing in the inner housing bearing (15). SEE FIGURE 25 & 26. When these components are in place, press **new** bearing (15) into the housing (21) to a depth of .130/.150 inches. Use the opposite end of the bearing mandrel used to press in outer bearing (22). Reference figure 1, in the “Tools and Materials Required for Servicing” section. SEE FIGURE 27.



Figure 26



Figure 27

**Press in dirt & water seal**

3. Press a **new** dirt and water seal (23) into the housing (21) outer bearing counterbore. The dirt and water seal (23) must be pressed in with the lip facing out and until the seal is flush to .020 inches (.51 mm) below the end of housing. SEE FIGURE 28.

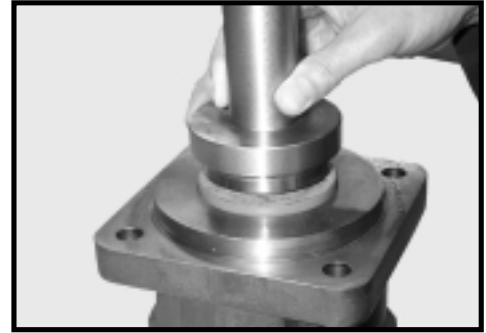


Figure 28

**Place housing assembly into vice**

4. Place housing (21) assembly into a soft jawed vise or similar support with the coupling shaft bore down, clamping against the mounting flange. SEE FIGURE 29.

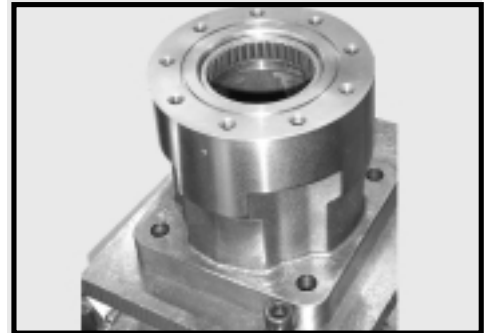


Figure 29

**Assemble backup washers & seal**

Housings (21) that did not require replacement of the bearing package will require that the two “captured” thrust washers (16) and thrust bearing (17) be unseated and vertical to the counterbore and the new backup ring (20), new backup washer (19), and new seal (18) be worked around the thrust bearing package and placed into their respective counterbores. The seal lip must face out of the seal counterbore and toward the inside of Torqmotor (see figure 45). Be sure the thrust bearing package is resealed correctly after assembly of the seal and backup washer. SEE FIGURES 30, 31 & 32.



Figure 30



Figure 31



Figure 32

**Apply masking tape to shaft**

7. Apply masking tape around splines or keyway on shaft (14) to prevent damage to seal. SEE FIGURE 33.

**Install coupling shaft**

8. Be sure that a generous amount of clean corrosion resistant grease has been applied to the lower (outer) housing bearing (22). Install the coupling shaft (14) into housing (21), seating it against the second thrust washer (16). SEE FIGURE 33.

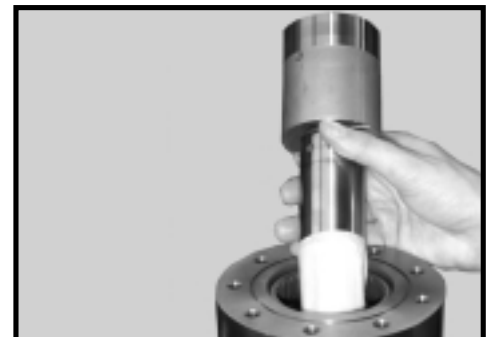


Figure 33

**CAUTION** The outer bearing (22) is not lubricated by the system's hydraulic fluid. Be sure it is thoroughly packed with the recommended grease, Parker Gear grease specification #045236, E/M Lubricant #K-70M or Mobil Mobilith SHC® 460 A packet of grease (P/N 406018) is included in each seal kit.

**NOTE** The coupling shaft (14) will be approximately .10 inch (2.54 mm) below the housing wear plate surface when correctly installed to allow the assembly of thrust bearing (13) and retaining washer (12). The coupling shaft must rotate smoothly on the thrust bearing package.

**Install thrust bearing** 9. Install thrust bearing (13) and retaining washer (12) onto the end of coupling shaft (14). SEE FIGURE 34.

**Insert seal ring** 10. Apply a small amount of clean grease to a **new** seal ring (5) and insert it into the housing (21) seal ring groove. SEE FIGURE 35.

**NOTE** One or two alignment studs screwed finger tight into housing (21) bolt holes, approximately 180 degrees apart, will facilitate the assembly and alignment of components as required in the following procedures. The studs can be made by cutting off the heads of 3/8-24 UNF 2A bolts that are over .5 inch (12.7 mm) longer than the bolts (1) used in the Torqmotor.



Figure 34

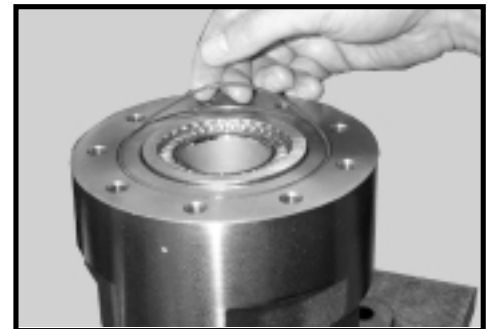


Figure 35

**Install drive link** 11. Install drive link (11) with the long splined end down into the coupling shaft (14) and engage the drive link splines into mesh with the coupling shaft splines. SEE FIGURE 36.

**NOTE** Use any alignment marks put on the coupling shaft and drive link before disassembly to assemble the drive link splines in their original position in the mating coupling shaft splines.



Figure 36



**Assemble seal ring** 12. Apply a small amount of clean grease to new seal rings (5) and assemble them into the seal ring grooves on the rotor set side of the wear plate (10) and on the manifold plate side of the rotor set stator (9B).

**Assemble wear plate and rotor set** 13. Assemble wear plate (10) with rotor set over the drive link (11) and alignment studs onto the housing (21) and the rotor splines into mesh with the drive link splines. SEE FIGURE 37.

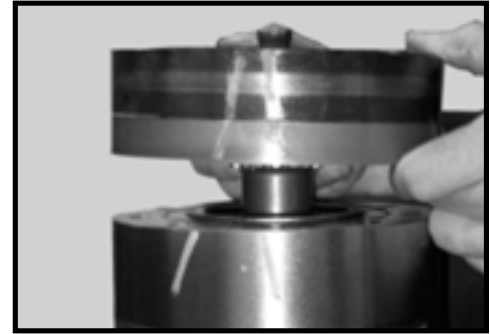


Figure 37

**NOTE** It may be necessary to turn one alignment stud out of the housing (21) temporarily to assemble rotor set (9) over the drive link.

**NOTE** The manifold (6) is made up of several plates bonded together permanently to form an integral component. The manifold surface that must contact the rotor set has it's series of irregular shaped cavities on the largest circumference or circle around the inside diameter. The polished impression left on the manifold by the rotor set is another indication of which surface must contact the rotor set.

**Assemble manifold** 16. Assemble the manifold (6) over the alignment studs and drive link (11) and onto the rotor set. Be sure the correct manifold surface is against the rotor set. SEE FIGURE 38.

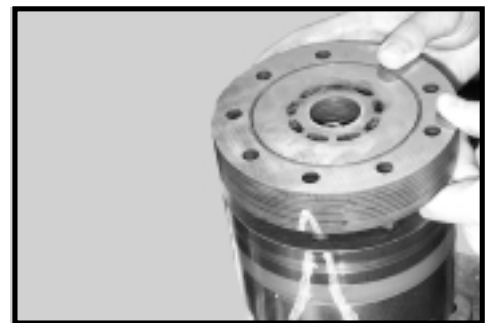


Figure 38

**Insert a seal in manifold** 17. Apply grease to a **new** seal ring (5) and insert it in the seal ring groove exposed on the manifold.

**Assemble seal & commutator** 19. Assemble a **new** seal ring (3) into commutator (4) and assemble commutator over the end of drive link (11) onto manifold (6) with seal ring side up. SEE FIGURE 39.

**Note** Remove alignment studs (if used) prior to assembly of end cover.



Figure 39

**Assemble  
end cover**

22. Assemble end cover over the commutator and in line with the alignment marks on the exterior of the motor. SEE FIGURE 40 and 41.



**Figure 40**



**Figure 41**

**Assemble  
cover bolts**

23. Assemble the 9 special bolts (1) and screw in finger tight. Remove and replace the two alignment studs with bolts after the other bolts are in place. Alternately and progressively tighten the bolts (SEE FIGURE 44), to pull the end cover and other components into place with a final torque of 44-55 ft. lbs. on each bolt. SEE FIGURE 42 & 43.



Figure 42

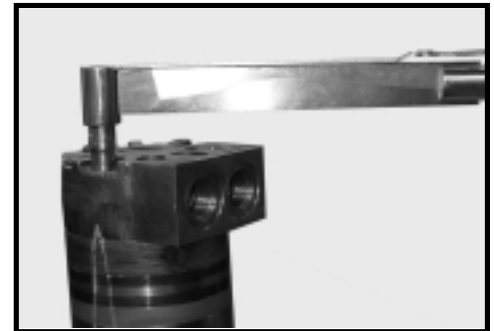


Figure 43

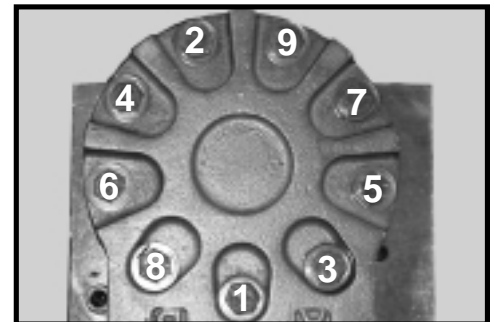


Figure 44

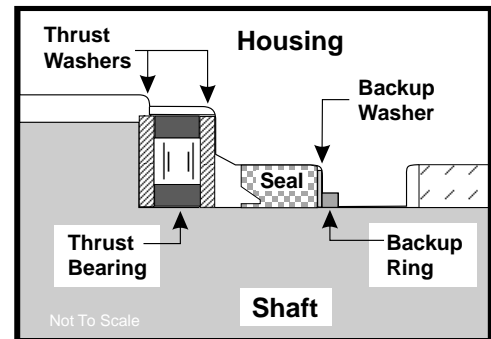


Figure 45

Large Frame

THE ASSEMBLY OF THE TORQMOTOR IS NOW COMPLETE EXCEPT FOR KEY (14A), NUT (14B), or OTHER EXTERNAL HARDWARE IF APPLICABLE. PROCEED TO FINAL CHECKS SECTION.

## Final Checks

- Pressurize the Torqmotor with 100 p.s.i. dry air or nitrogen and submerge in solvent to check for external leaks.
- Check Torqmotor for rotation. Torque required to rotate coupling shaft should not be more than 50 ft. lbs. (68 N m)
- On TK Series Torqmotor, pressure port with “A” cast under it on endcover (2) is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with “B” cast under it is for counter clockwise coupling shaft rotation.
- Use test stand if available, to check operation of the Torqmotor.

## Hydraulic Fluid

Keep the hydraulic system filled with one of the following:

- 10W40 SE or SF manufacturers suggested oil.
- Hydraulic fluid as recommended by equipment manufacturer, but the viscosity should not drop below 50 SSU or contain less than .125% zinc anti-wear additives.

**CAUTION: Do not mix oil types. Any mixture, or an unapproved oil, could deteriorate the seals. Maintain the proper fluid level in the reservoir. When changing fluid, completely drain old oil from the system. It is suggested also that you flush the system with clean oil.**

## Filtration

Recommended filtration 20-50 micron.

## Oil Temperature

Maximum operating temperature 200°F (93.3° C).

**Tips**

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**Tips for Maintaining the Torqmotor Hydraulic System**

- Adjust fluid level in reservoir as necessary.
- Encourage all operators to report any malfunction or accident that may have damaged the hydraulic system or component.
- Do not attempt to weld any broken Torqmotor component. Replace the component with original equipment only.
- Do not cold straighten, hot straighten, or bend any Torqmotor part.
- Prevent dirt or other foreign matter from entering the hydraulic system. Clean the area around and the filler caps before checking oil level.
- Investigate and correct any external leak in the hydraulic system, no matter how minor the leak.
- Comply with manufacturer's specifications for cleaning or replacing the filter.

**CAUTION: Do not weld, braze, solder or any way alter any Torqmotor component.**

**CAUTION: Maximum operating pressure must not exceed recommended Torqmotor pressure capacity.**

**CAUTION: Always carefully inspect any system component that may have been struck or damaged during operation or in an accident. Replace any component that is damaged or that is questionable.**

**CAUTION: Do not force any coupling onto the Torqmotor coupling shaft as this could damage the unit internally.**

Parker extends close technical cooperation and assistance. If problems occur which you cannot solve, please contact your local Parker approved Distributor or Parker Technical Support. Our phone number and fax number and address are on the back cover of this manual.



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**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

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**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**7. Special Tooling:** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the

right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**10. Indemnity For Infringement of Intellectual Property Rights:** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights. If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

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9/91-P



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